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(58) Field of search

B8A

B8H

B8C

**Selected US specifications from IPC sub-classes B65G
B65B**

(54) **Apparatus for introducing pieces of sweets into boxes or packaging inserts**

(57) Apparatus for introducing pieces of sweets, such as chocolates, boiled sweets, chocolate slabs or the like, into boxes or packaging inserts, with a sucker, grab or the like which extracts the individual pieces of sweets from a stock and which introduces them into the boxes or inserts (8) moving past this apparatus, wherein the suckers or grabs (7) are each located on a supporting arms (3, 5/4, 6) mounted on a continuously rotating carrier disc 1, and there is an industrial robot for the programmable control of the necessary movements of the supporting arms (3, 5/4, 6) away from the circular path of the support points for the arms on the disc.

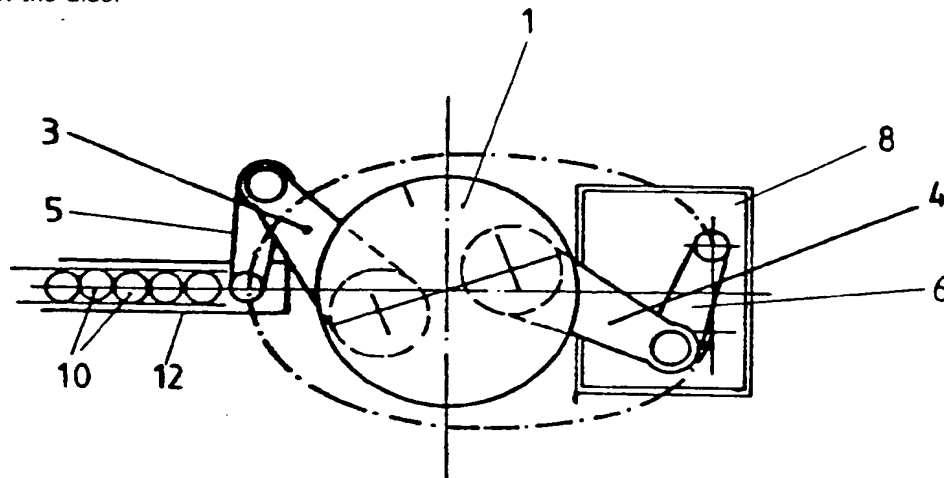


Fig. 2

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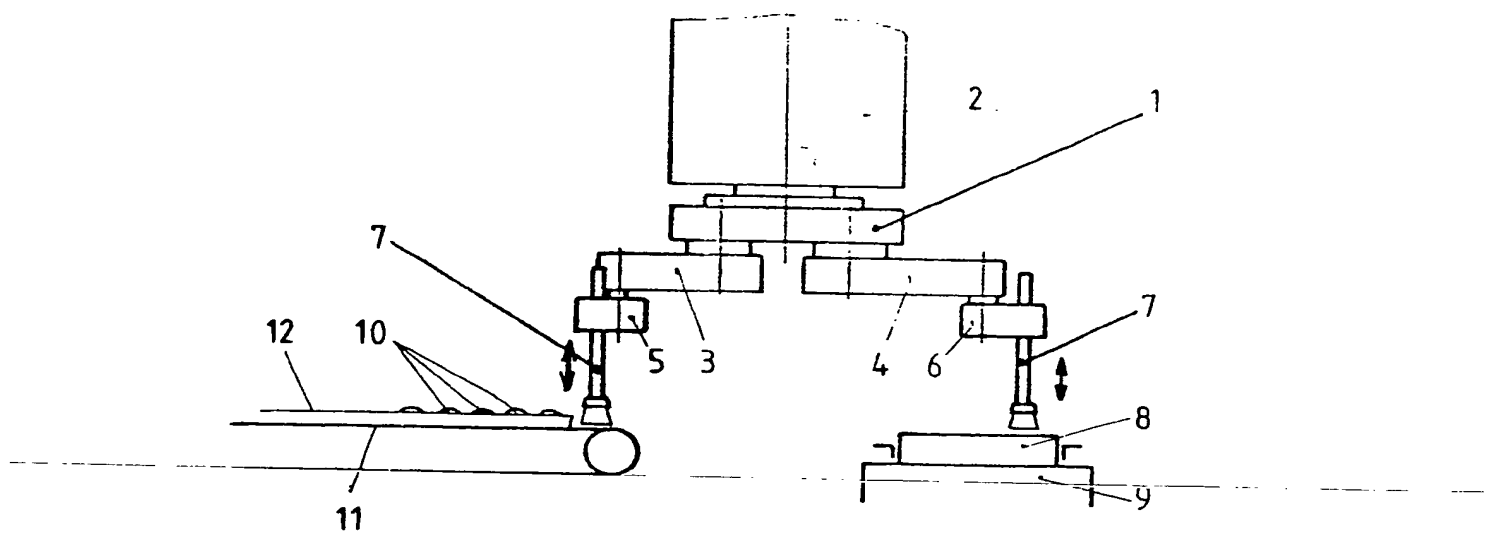


Fig. 1

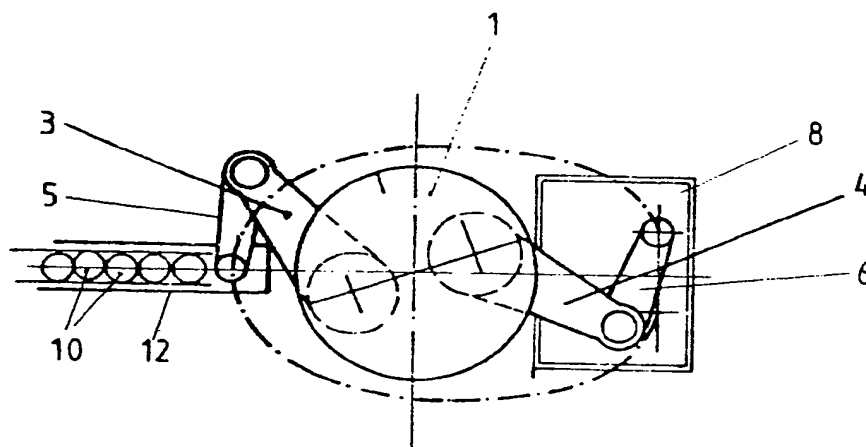
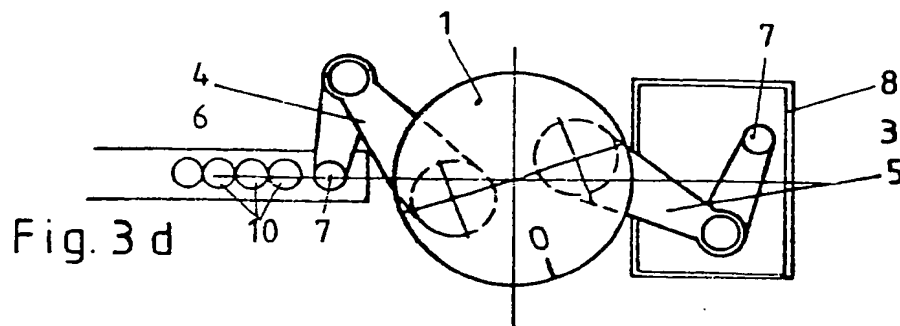
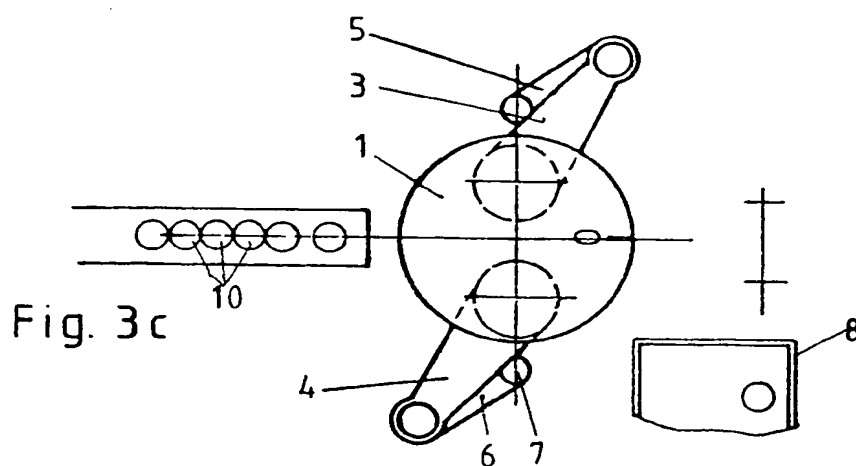
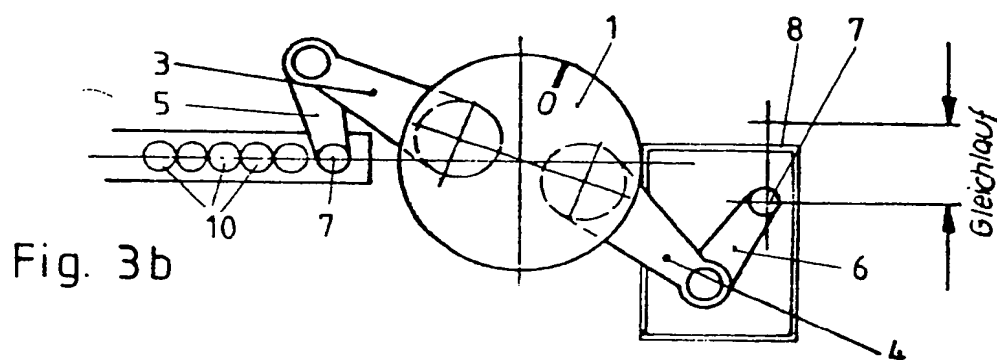
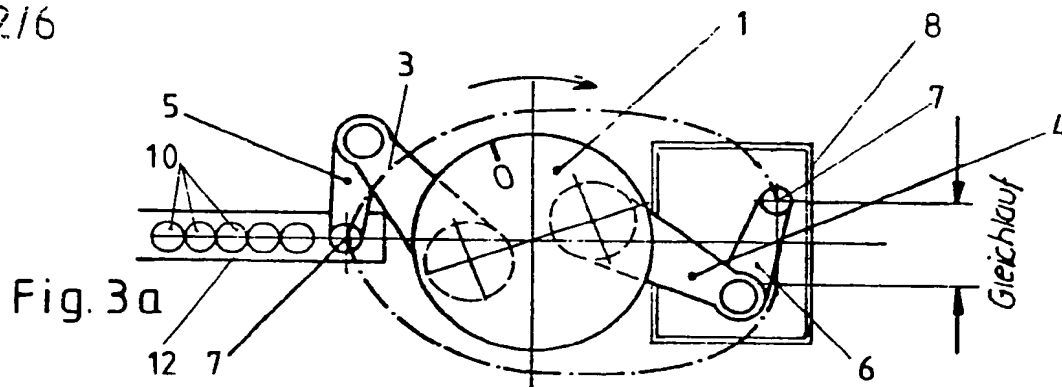


Fig. 2

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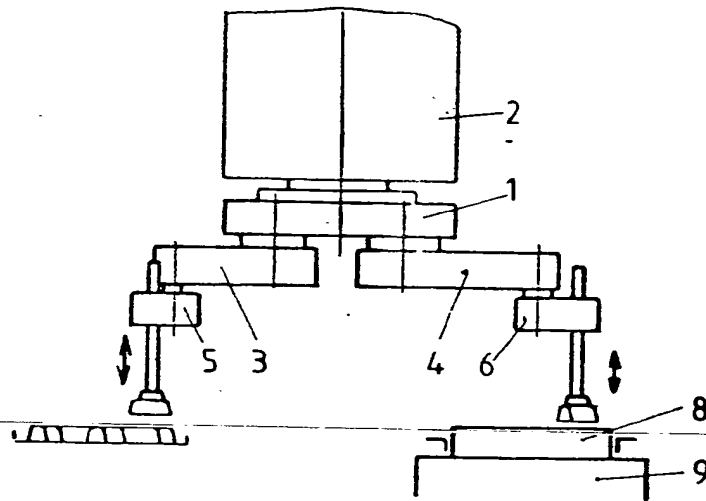


Fig. 4

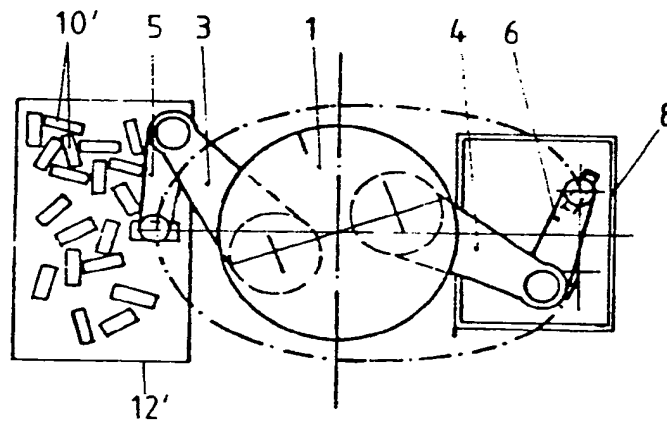


Fig. 5

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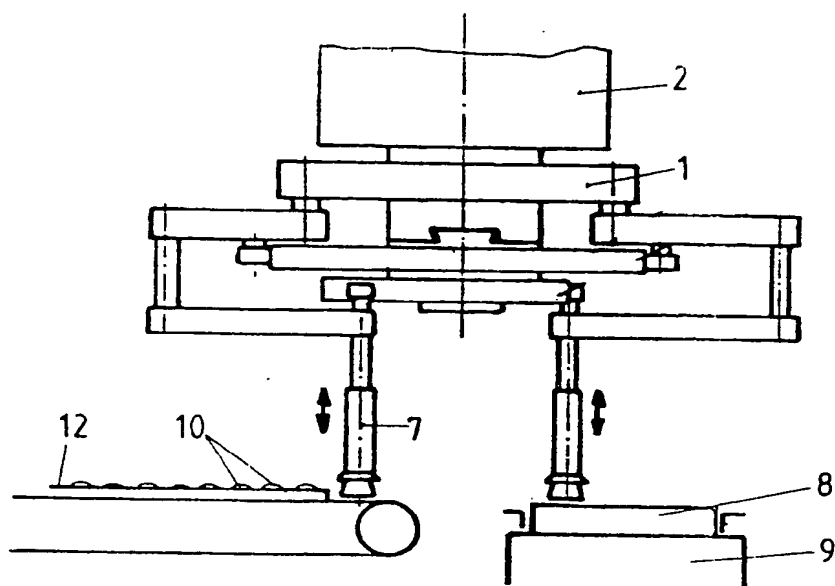


Fig. 6

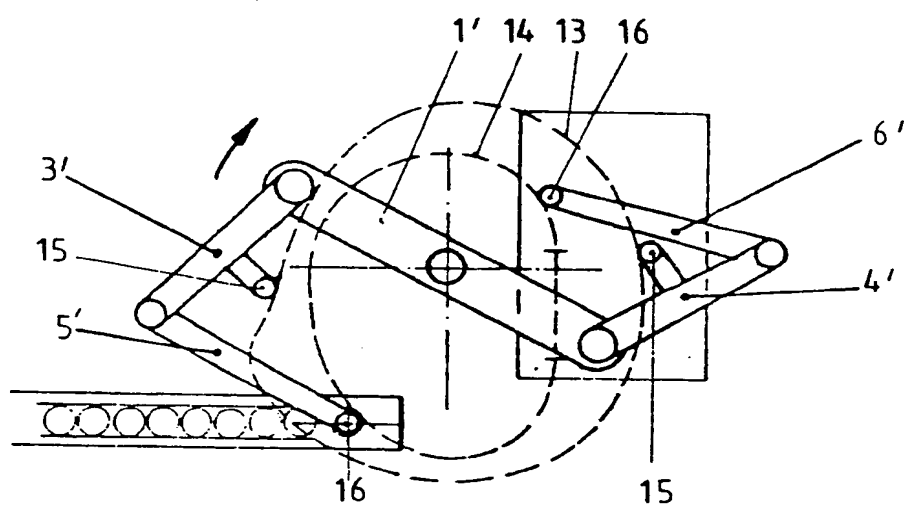


Fig. 7

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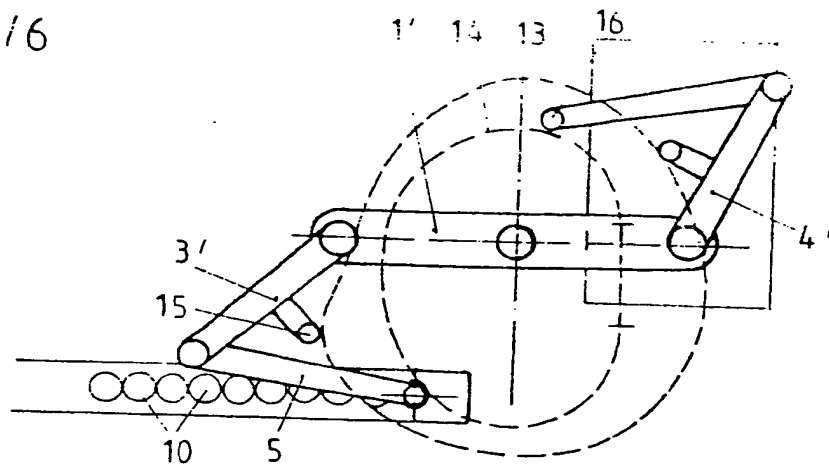


Fig. 8a

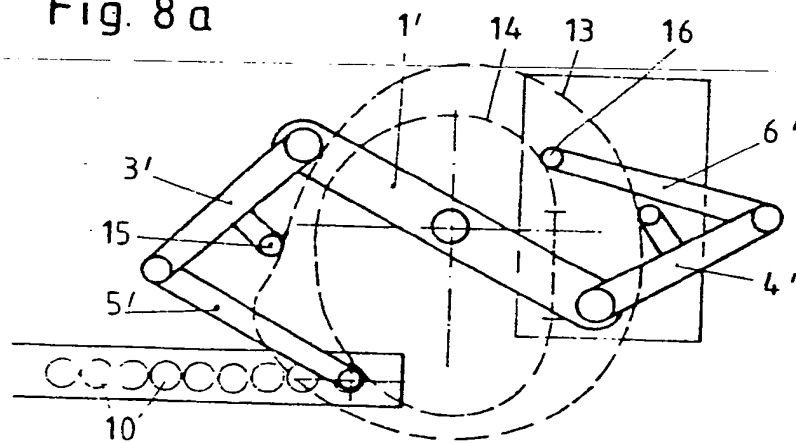


Fig. 8b

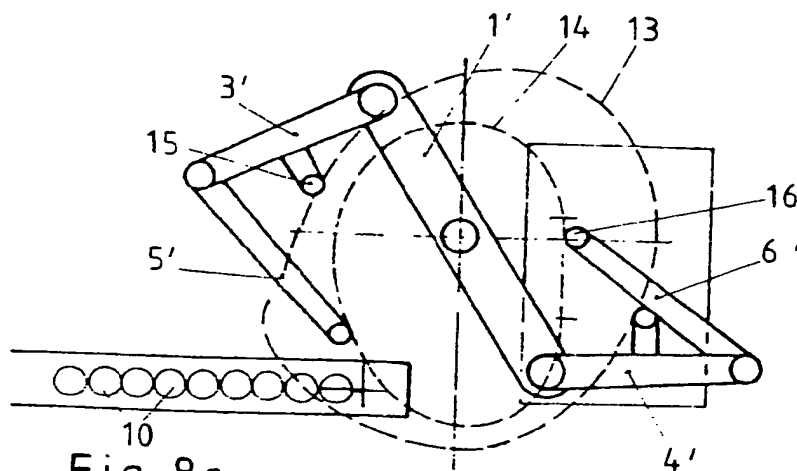
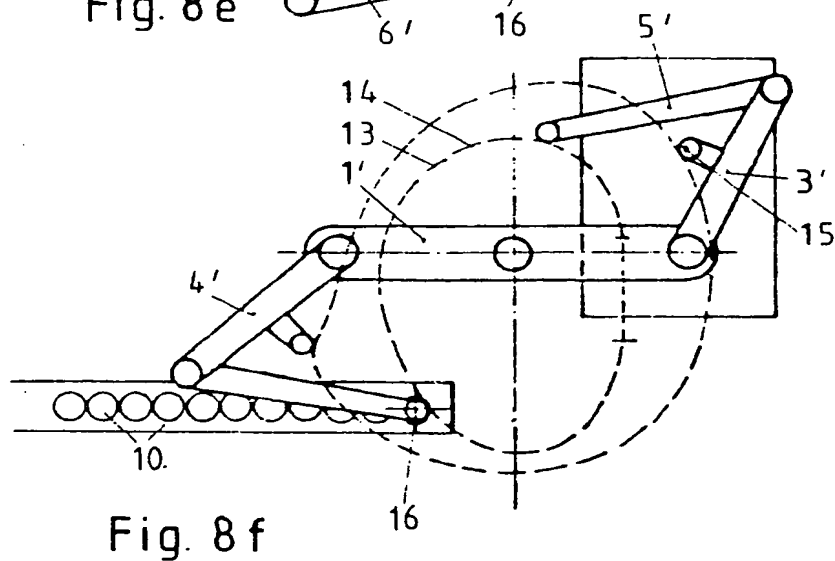
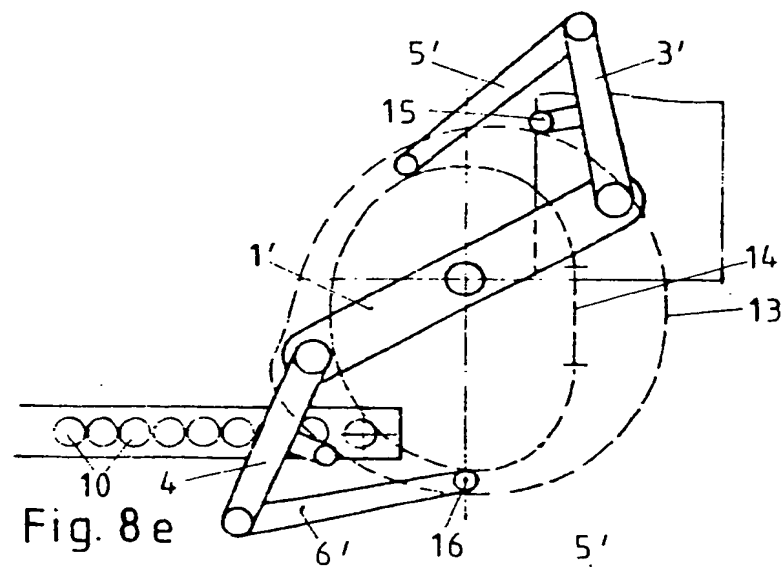
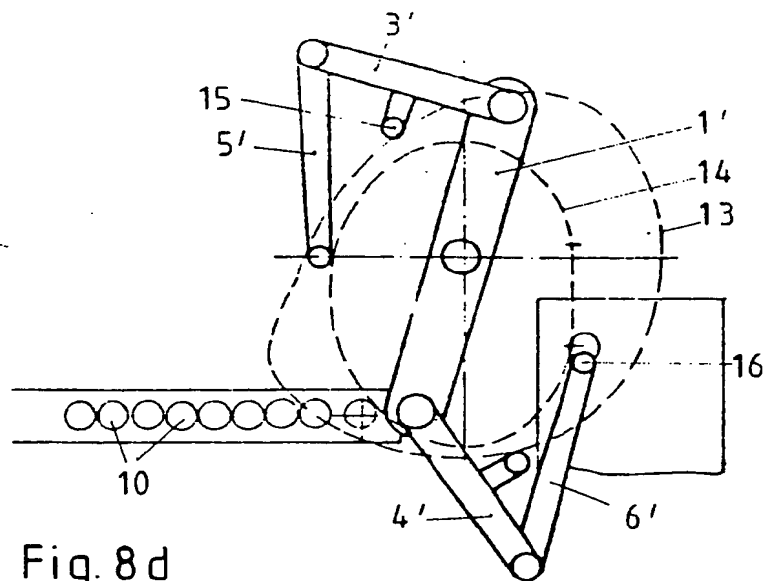


Fig. 8c

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SPECIFICATION

Apparatus for introducing pieces of sweets into boxes or packaging inserts

5 The invention relates to an apparatus for introducing pieces of sweets, such as chocolates, boiled sweets, chocolate slabs or the like, into boxes or packaging inserts. Because of the different shapes of the pieces of sweets to be accommodated in a pack, there is considerable difficulty in introducing them into the pack because the packaging level must always be maintained. German Patent Specification 15 1,956,246 has already proposed feeder devices with a suction grab or the like which extracts the individual pieces of sweets from a stock and introduces them into the boxes or inserts moving past along a transport zone.

20 Several feeder devices, corresponding to the number of different shapes of chocolates, are arranged in succession along a belt delivering the packaging boxes. It is possible only at a considerable technical outlay to change over to a different size on chocolate-packaging lines of this type. Any change-over presents great difficulty, so that it has been decided to operate all chocolate-packaging lines as single purpose installations. This method of production is economically justifiable only if, at the very least, single-shift working can be operated. Unfortunately, chocolate packs allowing this type of production are very rare.

35 The object of the invention is to rectify this defect and allow a rapid change-over of such chocolate-feeder devices. This is to be achieved at the least possible technical outlay, whilst at the same time ensuring a high packaging output.

40 This is achieved, according to the invention, where the suckers or grabs are each located on a supporting arm mounted on a continuously rotating carrier disc, and because an industrial robot is provided for the programmable control of correcting movements deviating from the circular movement of the supporting arm.

45 Preferably, several supporting arms provided with suckers or grabs and controlled by an industrial robot can be arranged on a carrier disc. The freely programmable industrial robot moving the grabs or suckers is of particular importance.

50 Especially advantageously, the supporting arms for the suckers or grabs can also be made multi-part, each part being controllable by the industrial robot. Finally, several delivery points for different pieces of sweets can also be assigned to the carrier disc.

60 To form a chocolate-packaging line, several carrier discs with supporting arms controlled by industrial robots can be provided for the inserts or boxes along the transport zone. It is also particularly important that the industrial robot is equipped with an optical eye which

causes the industrial robot to be controlled in such a way that it is possible to start from a stock of random portions of sweets arranged haphazardly, the industrial robot ensuring that the suckers or grabs are adjusted appropriately to the particular position of the individual pieces of sweets.

70 Finally, it is also possible, however, to do without the industrial robot and replace it by a cam drive or curve drive with exchangeable cam discs.

75 The idea of the invention allows a wide variety of possible designs, and some of these are illustrated in the attached drawing in which:

80 *Figures 1 and 2* show a side view and plan view of a feeder apparatus in a diagrammatic representation,

85 *Figures 3a to 3d* show various diagrammatic representations of the feeder apparatus in a plan view and in different successive operating positions,

90 *Figures 4 and 5* show a side view and plan view of a feeder apparatus working with an optical eye,

95 *Figures 6 and 7* show a side view and plan view of a feeder apparatus working with a cam control, and

100 *Figures 8a to 8f* show plan views of the apparatus according to Fig. 7 in various working positions.

A machine stand 2 supports the continuously rotating carrier disc 1, on which are mounted two supporting arms which are formed from the parts 3, 5 and 4, 6 respectively and each of which is equipped at its outer end with a sucker 7 grasping the chocolates 10. The chocolates 10 are delivered in a feed channel 12 by means of a conveyor belt and on the other side are introduced into a packaging insert or packaging box 8 which is delivered in a feed zone 9 by operating means not shown in any more detail.

105 The industrial robot used in the apparatus controls the supporting arms 3 and 4 or 5 and 6 and the suckers 7. It contains a programmable computer which is not the subject of the invention and which therefore also need not be illustrated in any more detail. Of course, the robots used have motors for driving the supporting arms 3, 4, 5, 6 and the suckers 7.

110 In the illustrated embodiment of the apparatus there are two freely programmable feeder devices. The suckers 7 follow a circular path when the supporting arms 3, 5 and 4, 6 are not actuated. The particular industrial robot used moves the supporting arms and corrects their deviation from the originally circular path of movement. In the position according to Fig. 3a, the supporting arm 3, 5 with the sucker 7 remains above the foremost piece of sweet arriving on the track 12 in order to suck it up and grasp it. On the opposite side of the apparatus, the supporting arm 4, 6 with the

sucker 7 comes into synchronism with the packaging box 8 moving past continuously. This allows the piece of sweet to be deposited accurately in the box, because sufficient time is available for this as a result of the synchronous movement.

In the position according to Fig. 3b, on the one hand the suction operation has ended. The carrier disc 1 has rotated approximately 30° further in the clockwise direction. At the same time, the synchronous movement of the other supporting arm for placing the piece of sweet in the box has also ended.

In the position according to Fig. 3c, the supporting arm 3, 5 supplies a piece of sweet to be deposited in a new packaging box 8, whilst the other supporting arm 4, 6 travels to the suction point over the delivery station of the pieces of sweets 10.

Finally, Fig. 3d shows how one feeder device sucks up a piece of sweet, whilst the other feeder device deposits a piece of sweet.

Another possibility is to arrange several delivery stations 12 for pieces of sweets 10 next to one another, so that the individual delivery stations supply different shapes of pieces of sweets which can then be received alternately, depending on the control executed by the industrial robot.

It can be seen from the illustrations in Figs. 3a to 3d that the feeder devices 3, 5 and 4, 6 are made to execute only the necessary deviations from the circular path by the particular industrial robot, whilst the carrier disc 1 executes only the main movement, namely a circular path. As a result, a particularly high feed output of approximately 65 pieces of sweets per minute becomes possible, and on the other hand a change-over to a different size can be made very quickly, because it is merely necessary to change the programming of the industrial robot in an appropriate way.

In the apparatus according to Figs. 4 and 5, the pieces of sweets 10' are delivered in random form or in a haphazard arrangement on a table 12', and in this case the industrial robot is provided with an optical eye. It is consequently programmed or controlled in such a way that even pieces of sweets arranged haphazardly can be picked up, the feeder apparatus adjusting to the particular position of the piece of sweet under the control of the optical eye. The advantage of this arrangement is that there is no need for any special feeding, the individual articles do not have to be separated, and finally any article shape can be used. The dimensional tolerances of the various articles likewise play no part in the suction operation.

In the embodiment of the apparatus according to Figs. 6, 7 and 8a to 8f, the industrial robots are replaced by cam discs 13, 14, on which the supporting arms 3, 5 and 4, 6 are supported by means of track rollers 15 and 16 respectively, and instead of the carrier disc

there is a rotating beam 1', on the ends of which the supporting arms 3', 5' and 4', 6' are mounted. The cam discs 13 and 14 are stationary, and during the continuous rotation of the beam 1' the supporting arms are controlled correspondingly by the cams 13, 14. The positions of the apparatus which are shown in Figs. 8a to 8f correspond to those of Figs. 3a to 3d.

Of course, the apparatus operating with cam discs is simpler and cheaper than the programmable industrial robots. When there is a change-over to a different size, it is merely necessary to exchange the fixed double cam, and this presents no difficulties at all.

CLAIMS

1. Apparatus for introducing pieces of sweets into boxes or packaging inserts, with pick-up members which extract the individual pieces of sweets from a stock and which introduce them into the boxes or inserts moving past along a transport zone, wherein the pick-up members are located on a supporting arm mounted on a continuously rotatable carrier element, and there is an industrial robot for the programmable control of correcting movements deviating from the normal movement of the supporting arm.

2. Apparatus according to Claim 1, characterised in that several supporting arms provided with suckers or grabs and controlled by an industrial robot are arranged on the carrier disc (1).

3. Apparatus for introducing pieces of sweets, such as chocolates, boiled sweets, chocolate slabs or the like, into boxes or packaging inserts, with a sucker, grab or the like which extracts the individual pieces of sweets from a stock and which introduces them into the boxes or inserts moving past along a transport zone, characterised by a freely programmable industrial robot moving the suckers or grabs.

4. Apparatus according to Claims 1 and 2, characterised in that the supporting arm for the suckers or grabs are made multi-part, and each part is controllable by the industrial robot.

5. Apparatus according to Claims 1 to 4, characterised in that several delivery points for different pieces of sweets are assigned to the carrier disc.

6. Apparatus according to Claims 1 to 5, characterised in that several carrier discs with supporting arms controlled by the industrial robot are provided along the transport zone for the inserts or boxes.

7. Apparatus according to Claims 1 to 6, characterised in that the industrial robot is equipped with an optical eye for controlling the supporting arm and sucker or grab to locate pieces of sweets arranged haphazardly in the stock.

8. Apparatus according to Claims 1 to 7,

characterised in that the industrial robot is replaced by a cam drive or curve drive with exchangeable discs.

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